### **Appendix B Meteorological Data**

This section contains meteorological data derived from various regulatory and non-regulatory sites. The data provides a comparative analysis of winds speed, wind direction, wind gusts and concentration data. Please note that meteorological instruments measure at different heights, and at different time intervals. By taking, the actual time of measurement and assuring that all data represented is in Pacific Standard Time (PST) there is uniformity of the data. In addition, not all stations measure at the exact same time, i.e. measurements at 053 and 056 therefore, comparisons are measurements within a 60-minute period. While there may be some overlapping and slight differences the comparative analysis provides the reader with a better understanding of the regional effect of the Exceptional Event.

METEOROLOGICAL SITES IN SOUTHEASTERN CALIFORNIA AND YUMA, ARIZONA

FIGURE B-1

Fig B-1: This image shows the meteorological sites and the air quality monitoring sites used in this document. Google Earth base map. Inset locator map of California from Wikipedia

## IMPERIAL COUNTY SITES FIGURES B-2 THROUGH B-9

FIGURE B-2
IMPERIAL COUNTRY AIRPORT (KIPL)
WIND SPEED & GUSTS (AVERAGES) AND DIRECTION
DECEMBER 26, 2015

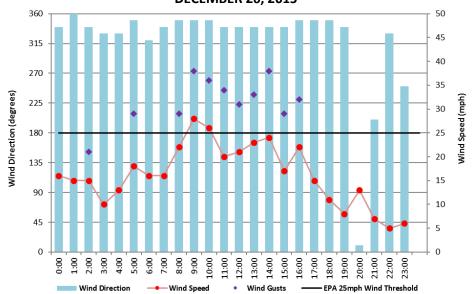
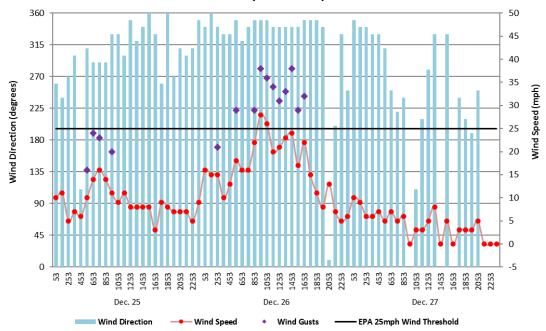
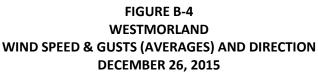
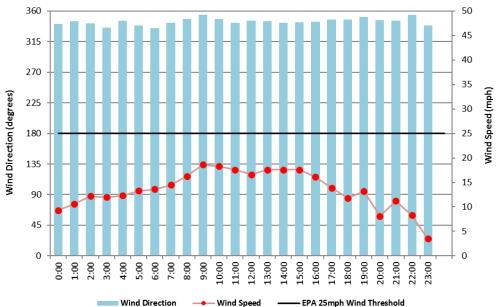


FIGURE B-3
IMPERIAL COUNTRY AIRPORT (KIPL)
WIND SPEED & GUSTS (AVERAGES) AND DIRECTION

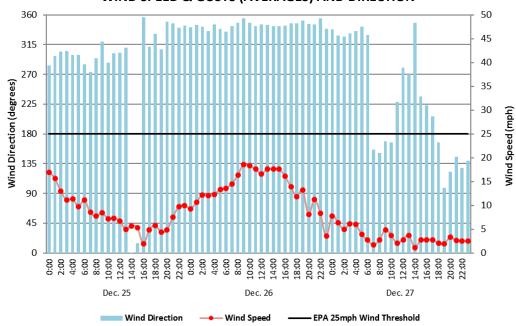


**Figs B-1 & B-2:** Imperial Airport meteorological data for December 26, 2015 and December 25-27, 2015. Wind data from the NCEI's QCLCD system





## FIGURE B-5 WESTMORLAND WIND SPEED & GUSTS (AVERAGES) AND DIRECTION



**Figs B-4 & B-5:** Westmorland meteorological data for December 26, 2015 and December 25-27, 2015, shows an increase in wind speed starting the morning hours on December 26, 2015. Winds at Westmorland were more subdues than at Niland, which allowed for the deposition of dust. Wind data from the EPA's AQS system

FIGURE B-6
EL CENTRO NAF (KNJK)
WIND SPEED & GUSTS (AVERAGES) AND DIRECTION
DECEMBER 26, 2015

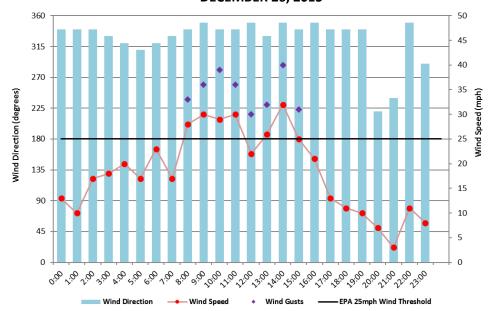
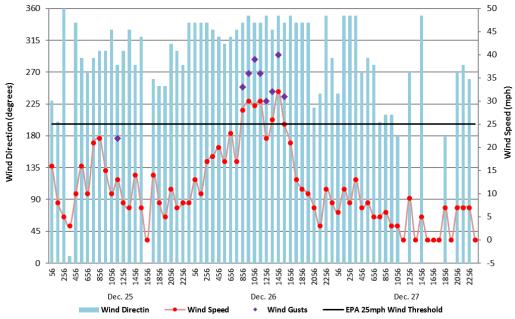
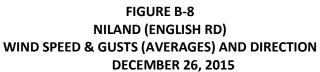
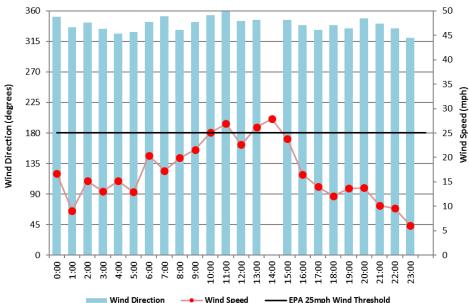


FIGURE B-7
EL CENTRO NAF (KNJK)
WIND SPEED & GUSTS (AVERAGES) AND DIRECTION

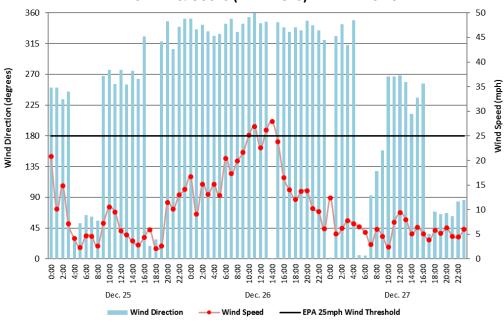


**Figs B-6 and B-7:** the El Centro NAF meteorological data for December 26, 2015, and December 25-27, 2015, shows a dramatic increase in wind speed starting the morning of December 26, 2015. Wind data from the NCEI's QCLCD system





## FIGURE B-9 NILAND (ENGLISH RD) WIND SPEED & GUSTS (AVERAGES) AND DIRECTION



**Figs B-8 & B-9:** Niland shows a dramatic increase in wind speed staring the morning of December 26, 2015. Wind data from the EPA's AQS system

#### **WIND ROSES**

FIGURE B-10
WESTMORLAND WIND ROSE
DECEMBER 26, 2015

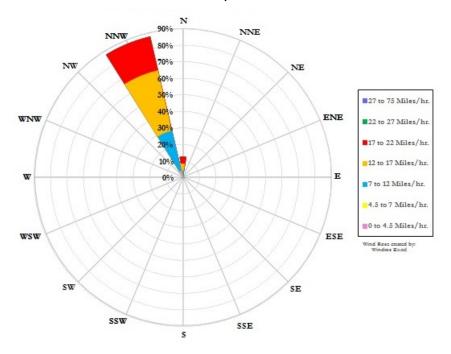


FIGURE B-11 EL CENTRO NAF WIND ROSE DECEMBER 26, 2015

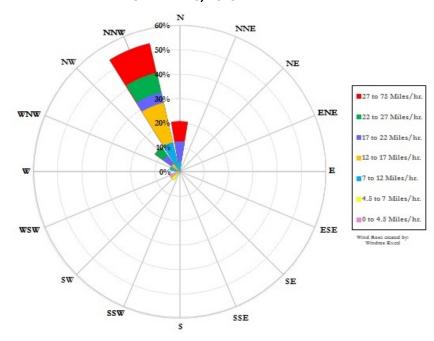


FIGURE B-12
IMPERIAL COUNTY AIRPORT WIND ROSE
DECEMBER 26, 2015

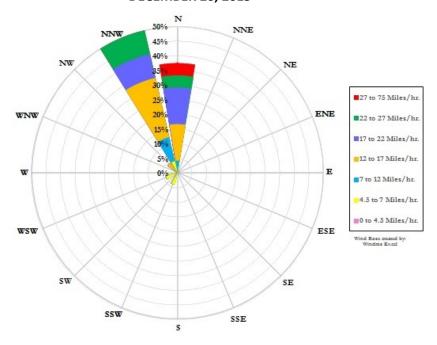
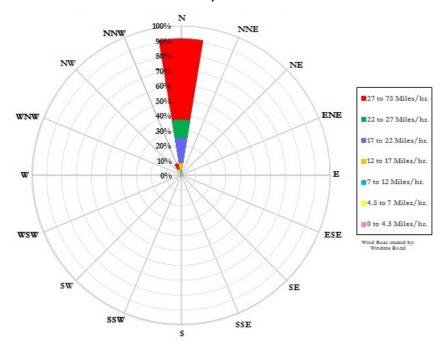


FIGURE B-13
BLYTHE AIRPORT (KBLH) WIND ROSE
DECEMBER 26, 2015



**Fig B-10 through B-13:** All the wind roses show a NNW to f N direction. Blythe Airport is upstream of Westmorland and the Imperial Valley

#### **EASTERN RIVERSIDE COUNTY SITES**

FIGURE B-14
PALM SPRINGS INTERNATIONAL AIRPORT (KPSP)
WIND SPEED & GUSTS (AVERAGES) AND DIRECTION

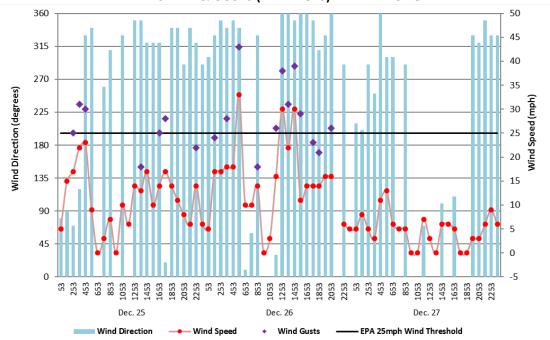
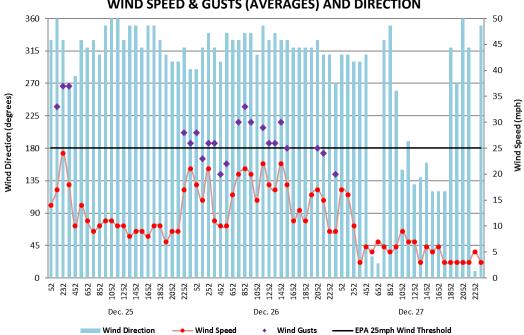
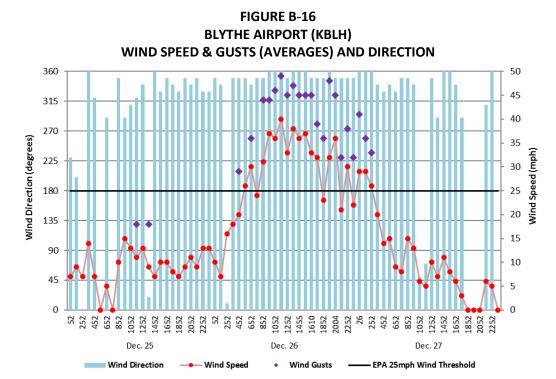


FIGURE B-15

JACQUELINE COCHRAN REGIONAL AIRPORT (KTRM)
WIND SPEED & GUSTS (AVERAGES) AND DIRECTION





**Figs. B-14 through B-16:** This collection demonstrates the regional extent of the wind event. Wind data for all sites from the NCEI's QCLCD system.

**SOUTHWESTERN ARIZONA** 

#### FIGURE B-17 YUMA MCAS (KNYL) WIND SPEED & GUSTS (AVERAGES) AND DIRECTION Wind Direction (degrees) Wind Direction

**Fig B-17:** Yuma MCAS is downstream from Westmorland in southwestern Arizona, near the southeastern portion of Imperial County. Wind data from the NCEI's QCLCD system

#### 

#### **UPSTREAM WIND SITES**

# FIGURE B-18 BOMBAY BEACH WIND SPEED & GUSTS (AVERAGES) AND DIRECTION

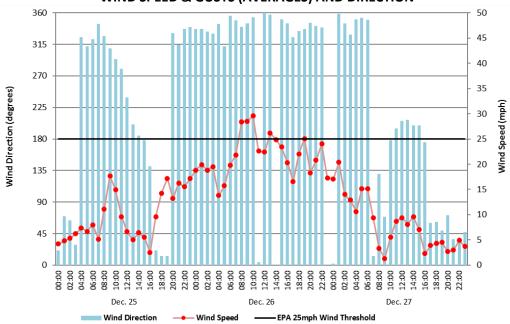


Fig B-18: Bombay Beach is north and upstream to Westmorland. Data from AQMIS

## FIGURE B-19 NEEDLES AIRPORT (KEED) WIND SPEED & GUSTS (AVERAGES) AND DIRECTION

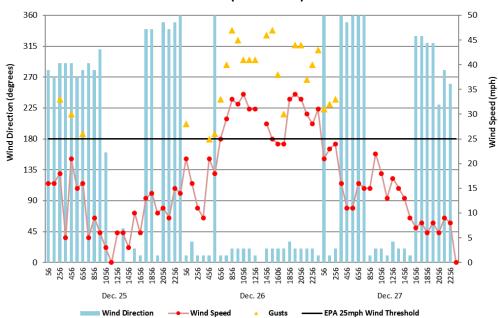


Fig B-19: Needles Airport (KEED) wind data from the NCEI's QCLCD system

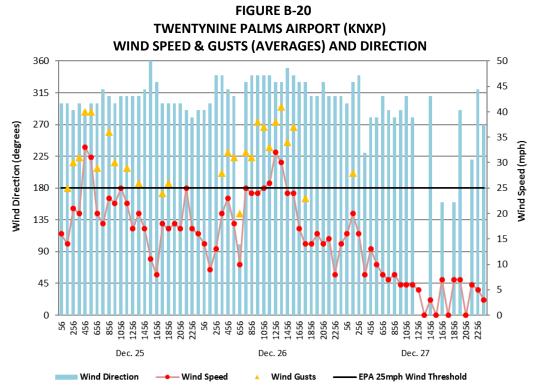
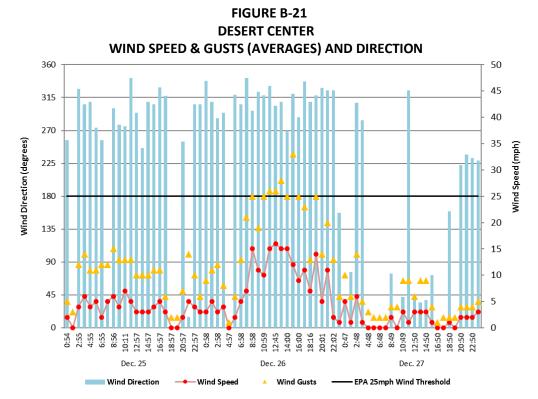


Fig B-20: Twentynine Palms (KNXP) wind data from the NCEI's QCLCD system



**Fig B-21:** Desert Center (Station ID EW7734) wind data from the University of Utah's MesoWest system

#### FIGURE B-22 EL CENTRO NAF KNJK QCLCD

U.S. Department of Commerce National Oceanic & Atmospheric Administration QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (may be updated) HOURLY OBSERVATIONS TABLE NAF (23199) EL CENTRO, CA (12/2015) National Climatic Data Center Federal Building 151 Patton Avenue Asheville, North Carolina 28801

Elevation: -42 ft. below sea level

Latitude: 32.816 Longitude: -115.683 Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	E	Dry Bulb emp	В	Vet ulb emp	F	Dew Point emp	Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti- meter (in. hg)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
26 26 26 26 26 26 26 26 26 26 26 26 26 2	0056 0156 0256 0356 0456 0556 0656 0756 0856 1056 1156 1256 1456 1456 1756 1856 1956 2056 2156 2256 2356	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	CLR SCT025 CLR CLR CLR CLR CLR CLR	8.00 9.00 10.00 4.00 4.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00	HZ BLDU BLDU BLDU BLDU BLDU BLDU BLDU BLDU	47 49 50 50 48 49 50 53 55 57 58 59 60 59 57 54 44 45 44 45	7.8 8.3 9.4 10.0 10.0 9.4 10.0 11.7 12.8 13.9 12.2 15.0 10.0 8.9 6.7 7.2 6.7 6.7	37 38 37 36 36 37 39 40 40 41 41 41 40 40 38 37 37 36 37 37 37 37 37 37 37 37 37 37 37 37 37	2.9 3.6 3.2 2.7 2.2 2.9 3.6 4.2 4.5 4.9 4.9 4.4 4.1 3.3 2.6 2.2 2.2 2.2 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	22 17 13 14 12 15 13 10 10 8 5 1 6 7 8 12 14 13 13 13 13 13 14 13 14 15 16 16 16 16 16 16 16 16 16 16 16 16 16	-5.6 -5.6 -8.3 -10.6 -10.0 -11.1 -9.4 -10.6 -12.2 -13.3 -17.2 -14.4 -13.9 -10.6 -10.6 -10.6 -10.6 -10.6 -10.6	35 27 23 225 225 225 19 15 15 13 11 19 13 15 22 25 27 22 27 22 27 22 27 22 27 27 28 28 28 28 28 28 28 28 28 28 28 28 28	17 18 20 17 23 17 28 30 29 22 26 30 22 26 22 25 21 13 10s 7s 3s 11	350 340 340 350 330 350	33 36 39 36 30 32 40 31	30.12 30.14 30.15 30.17 30.17 30.25 30.28 30.28 30.31 30.32 30.32 30.26 30.26 30.26 30.27 30.27 30.29 30.30 30.30 30.30 30.30 30.30 30.30 30.30 30.30 30.30			30.14 30.16 30.18 30.22 30.25 30.29 30.32 30.32 30.32 30.32 30.27 30.25 30.27 30.25 30.27 30.25 30.25 30.25 30.25 30.25 30.25 30.25 30.25 30.25 30.25 30.25			30.08 30.10 30.11 30.13 30.15 30.21 30.27 30.27 30.27 30.24 30.27 30.24 30.21 30.22 30.25

Dynamically generated Tue Apr 26 19:36:40 EDT 2016 via http://www.ncdc.noaa.gov/aclcd/OCLCD

### FIGURE B-23 BLYTHE AIRPORT (KBLH) QCLCD

U.S. Department of Commerce National Oceanic & Atmospheric Administration QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final) HOURLY OBSERVATIONS TABLE BLYTHE AIRPORT (23158) BLYTHE, CA (12/2015) National Climatic Data Center Federal Building 151 Patton Avenue Asheville, North Carolina 28801

Elevation: 395 ft. above sea level Latitude: 33.618 Longitude: -114.714 Data Version: VER3

Date	Time Statio		Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp	Bulb Temp (F) (C) (F		ew oint emp (C)	Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti- meter (in. hg)
1	2	3	4	5	6	7 8			12	13	14	15	16	17	18	19	20	21	22	23
26 26 26 26 26 26 26 26 26 26 26 26 26 2	0152 0252 0452 0452 0552 0652 0652 0859 0859 0850 0950 0952 1150 1150 1152 1223 1240 1252 1337 1352 1444 1445 1450	12 12 12 12 12 12 12 12 12 12 12 12 12 1	CLR CLR CLR CLR CLR CLR CLR CLR CEW007 FEEW007 CLR CEW007 CLR	10.00 10.00 10.00 4.00 10.00 1	地区 化化过滤性化过滤性化过滤性化过滤性化过滤性化过滤性化过滤性化过滤性化过滤性化过滤	52 11.0 52 11.1 53 11.7 54 12.2 55 12.8 55 13.0 55 13.0 56 13.3 57 13.9 56 13.3 57 13.9 56 13.3 56 13.3 56 13.3 55 12.8 55 12.8 55 5 12.8	34 1.2 34 1.1 36 2.2 36 2.1 36 2.1 36 2.1 37 2.9 37 2.9 37 3.0 38 3.2 38 3.2 38 3.2 38 3.3 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8	14 - 14 - 14 - 14 - 14 - 14 - 14 - 14 -	.10.0 10.0 11.1 11.1 11.1 11.7 11.7 11.7	30 227 227 224 225 221 221 221 221 221 221 231 241 252 211 211 211 211 211 211 211 211 21	10 7 7 16 8 220 226 226 225 22 25 22 25 22 25 26 27 27 27 28 27 28 27 28 27 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	350 340 350 350 350 350 360 360 360 360 360 360 360 360 360 36	269 36 377 444 446 444 446 445 446 447 443 445 447 447	29.63 29.63 29.65 29.65 29.67 29.67 29.70 29.70 29.77 29.77 29.77 29.77 29.77 29.77 29.77 29.77 29.77 29.77 29.77 29.73			30.17 M M M M M M M M M M M M M M M M M M M	AAAAAAAAAAAAABBBAABBAABBAABBBAABBBAABBBB		30.05 30.05 30.07 30.08 30.09 30.10 30.12 30.14 30.18 30.19 30.19 30.19 30.19 30.19 30.19 30.19 30.11 30.15

### FIGURE B-24 IMPERIAL COUNTY AIRPORT (KIPL) QCLCD

U.S. Department of Commerce National Oceanic & Atmospheric Administration QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final) HOURLY OBSERVATIONS TABLE IMPERIAL COUNTY AIRPORT (03144) IMPERIAL, CA

(12/2015)

National Climatic Data Center Federal Building 151 Patton Avenue Asheville, North Carolina 28801

Elevation: -58 ft. below sea level

Latitude: 32.834 Longitude: -115.578 Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	E	Dry Bulb emp	B Te	Vet Julb emp	-	Dew Point emp	Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti- meter (in. hg)
1	2	3	4	5	6	7	8	9	-	11		13	14	15	16	17	18	19	20	21	22	23
	0153 0253 0353 0453 0553 0653 0753 0853 1053 1153 1153 1253 1353 1453 1653 1753 1853 1953 2053 2153	12 12 12 12 12 12 12 12 12 12 12 12 12	CLR	10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 9.00 10.00 8.00 7.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00	HZ.	50 51 50 50 50 50 49 51 54 55 57 58 60 61 58 53 53 52 47	11.1 10.0 10.6 10.0 10.0 9.4 10.6 12.2 12.8 13.9 14.4 15.6 16.1 16.1 14.4 13.3 12.2 11.7 11.7 11.7 11.7 11.7	39 39 38 37 38 40 39 40 41 41 41 41 41 41 33 33 37 37 37 37 37 37 37 37	4.0 4.2 4.0 3.9 3.3 2.5 4.2 4.0 4.4 4.7 5.0 5.2 5.1 4.5 3.7 3.0 2.8 3.0 2.8 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	23 22 23 22 18 14 17 16 11 9 9 6 4 3 7 4 6 6 7 7 8 12 13	-5.0 -5.6 -5.6 -7.8 -10.0 -8.3 -8.3 -11.7 -12.8 -12.8 -14.4 -13.9 -13.9 -13.9 -13.3 -11.1 -10.6	35 32 35 32 28 25 26 22 27 17 15 14 11 10 13 12 14 15 15	15 10 11 11 11 16 12 22 28 20 21 22 21 22 21 22 24 21 22 25 26 27 27 27 28 27 27 28 27 27 27 27 27 27 27 27 27 27 27 27 27	330 330 350 320 340 350 350 350 340 340 340 340	29 38 36 34 31 33 38 29	30.12 30.13 30.13 30.14 30.16 30.21 30.21 30.27 30.32 30.32 30.32 30.27 30.25 30.25 30.26 30.29 30.29 30.30 30.29 30.30 30.29 30.30 30.30 30.30 30.30 30.30 30.30 30.30 30.30			30.06 30.08 30.10 30.12 30.14 30.18 30.21 30.23 30.24 30.24 30.19 30.19 30.19 30.19 30.19 30.19 30.22 30.22 30.22	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		30.06 30.07 30.08 30.10 30.15 30.15 30.21 30.23 30.25 30.21 30.25 30.21 30.19 30.18 30.19 30.19 30.20 30.20 30.20 30.23 30.22 30.23

Dynamically generated Tue Apr 26 19:38:59 EDT 2016 via http://www.ncdc.noaa.gov/aclcd/OCLCD

## FIGURE B-24 TWENTYNINE PALMS AIRFIELD (KNXP) QCLCD

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service
Elev: 2051 ft. Lat: 34.3000° N Lon: -116.1667° W
Station: TWENTYNINE PALMS MC, CA US WBAN:93121

Local Climatological Data Hourly Observations December 2015 Generated on 05/03/2017 National Centers for Environmental Information 151 Patton Avenue Asheville, North Carolina 28801

D	Time	Sta- tion	Sky	Visi-	Weather Type (see documentation)		Dry Bulb Temp		Bulb mp	Dew Point Temp		Rel Hum	Wind Speed		Wind Gusts	Station Press	Press.	Net 3- Hr	Sea Level	Report	Precip Total	Alti- meter
t e	(LST)	Туре	Conditions	bility	AU   AW   MW	(F)	(C)	(F)	(C)	(F)	(C)	%	(MPH)		(MPH)	(inHg)	Tend	Change (inHg)	Press. (inHg)	Type	(in)	Setting (inHg)
26	0056	7	CLR:00	10.00		37	2.8	31	-0.5	14	-10.0	39	14	290		27.76	8	+0.00	30.13	FM-15		30.17
26	0156	7	CLR:00	10.00		35	1.7	29	-1.5	11	-11.7	37	9	300		27.78			30.16	FM-15		30.19
26	0256	7	CLR:00	10.00		38	3.3	32	0.0	12	-11.1	34	13	340		27.79			30.16	FM-15		30.20
26	0356	7	CLR:00	10.00		38	3.3	32	0.0	11	-11.7	33	20	340	28	27.79	1	-0.03	30.16	FM-15		30.20
26	0456	7	CLR:00	10.00		37	2.8	31	-0.4	9	-12.8	31	23	320	32	27.83			30.22	FM-15		30.24
26	0556	7	CLR:00	10.00		37	2.8	31	-0.4	8	-13.3	30	18	310	31	27.85			30.23	FM-15		30.26
26	0656	7	CLR:00	10.00		37	2.8	31	-0.4	7	-13.9	28	10	100	20	27.89	3	-0.11	30.29	FM-15		30.31
26	0756	7	CLR:00	10.00		39	3.9	33	0.7	7	-13.9	26	25	330	32	27.92			30.32	FM-15		30.34
26	0856	7	CLR:00	10.00		41	5.0	35	1.9	6	-14.4	23	24	340	31	27.95			30.35	FM-15		30.37
26	0956	7	CLR:00	9.00		43	6.1	38	3.3	4	-15.6	20	24	340	38	27.97	1	-0.07	30.36	FM-15		30.39
26	1056	7	CLR:00	10.00		45	7.2	41	4.8	2	-16.7	16	25	340	37	27.97		- 8	30.36	FM-15		30.39
26	1156	7	CLR:00	9.00		46	7.8	42	5.8	0	-17.8	14	26	340	33	27.94			30.34	FM-15		30.36
26	1256	7	CLR:00	8.00		47	8.3	44	6.4	0	-17.8	14	32	330	38	27.91	8	+0.05	30.30	FM-15		30.33
26	1356	7	CLR:00	9.00		47	8.3	44	6.8	-2	-18.9	13	30	330	41	27.91			30.30	FM-15		30.33
26	1456	7	CLR:00	10.00		47	8.3	44	6.9	-3	-19.4	12	24	350	34	27.92			30.30	FM-15		30.34
26	1556	7	CLR:00	10.00		46	7.8	43	6.2	-3	-19.4	13	24	340	37	27.91	8	+0.00	30.30	FM-15		30.33
26	1656	7	CLR:00	10.00		44	6.7	40	4.6	-1	-18.3	15	17	330		27.93			30.32	FM-15		30.35
26	1756	7	CLR:00	10.00		43	6.1	39	3.9	-1	-18.3	16	14	330	23	27.94			30.33	FM-15		30.36
26	1856	7	CLR:00	10.00		41	5.0	37	2.8	-2	-18.9	16	14	310		27.96	3	-0.05	30.36	FM-15		30.38
26	1956	7	CLR:00	10.00		41	5.0	37	2.6	-1	-18.3	17	16	310		27.97		V2000000	30.36	FM-15		30.39
26	2056	7	CLR:00	10.00		40	4.4	36	2.0	-1	-18.3	18	14	330		27.96			30.35	FM-15		30.38
26	2156	7	CLR:00	10.00		39	3.9	35	1.4	-1	-18.3	18	15	310		27.96	8	+0.00	30.35	FM-15		30.38
26	2256	7	CLR:00	10.00		38	3.3	33	0.7	0	-17.8	20	8	310		27.96			30.35	FM-15		30.38
26	2356	7	CLR:00	10.00		39	3.9	34	1.3	0	-17.8	19	14	310		27.95			30.34	FM-15		30.37